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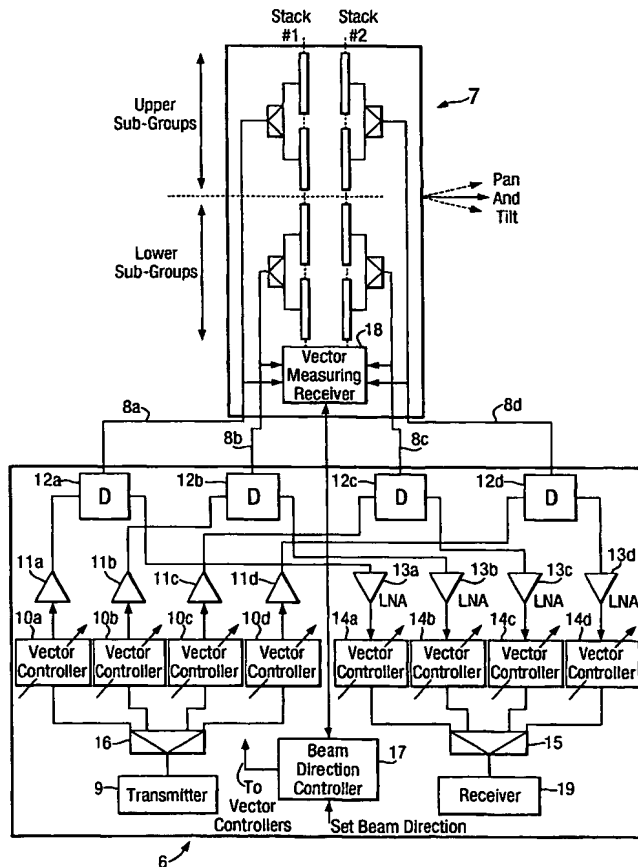
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[Continued on next page]

(54) Title: MOBILE RADIO BASE STATION



(57) Abstract: A mobile-radio base station for a telecommunications system includes vector modulator means for independently controlling the phase and/or amplitude of a plurality of component signals representative of the signal to be transmitted or received, such that when these signals pass through a plurality of antenna elements, a beam is formed in a direction according to the phase relationship of the component signals. The invention also includes interface means allowing other base stations to be coupled to the same antenna, with each base station having independent control of its beam direction. Provision is included for phase compensation of the signals to correct for errors introduced by unequal and variable component signal path lengths between the base station and the antenna. The vector modulator means is arranged to operate at low power levels, where it can operate more efficiently.



(84) **Designated States (regional):** ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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- with international search report
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24 June 2004

Declaration under Rule 4.17:

- of inventorship (Rule 4.17(iv)) for US only

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference IP/P7155/WOD	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 03/04447	International filing date (day/month/year) 15/10/2003	(Earliest) Priority Date (day/month/year) 19/10/2002
Applicant QINETIQ LIMITED		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

2

☐ None of the figures.

INTERNATIONAL SEARCH REPORT

National Application No

PCT/GB 03/04447

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H01Q1/24 H01Q3/26 H04Q7/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01Q H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 841 827 A (LUCENT TECHNOLOGIES INC) 13 May 1998 (1998-05-13)	1,4-8,11
Y	figures 16,17 page 18, line 23-57 ---	2,3,9, 10,12-15
X	US 5 784 031 A (KARMI YAIR ET AL) 21 July 1998 (1998-07-21) abstract; figures 3A,3B column 4, line 29 -column 5, line 4 ---	1,4,5,11
Y	WO 01 35684 A (QUALCOMM INC) 17 May 2001 (2001-05-17) abstract page 5, line 1 -page 6, line 2 page 7, line 14-20 ---	9,10, 12-15
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Date of the actual completion of the international search

8 March 2004

Date of mailing of the international search report

23/04/2004

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 03/04447

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 546 090 A (ROY III RICHARD H ET AL) 13 August 1996 (1996-08-13) abstract; figures 1-5 column 2, line 13-31 column 2, line 63 -column 5, line 63 ----	2,3
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 03/04447

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Your Reference: IP/P7155
Application No: GB 0224341.8

4 April 2003

Dear Sirs

Patents Act 1977: Search Report under Section 17(5)

I enclose two copies of my search report and a copy of the citations.

Please note that the scope of the claimed base station is uncertain, as there appear to be characterising features that do not form part of the base station being claimed. Claims 1, 10 and 11, at least, are unclear. At this stage the claims are being treated as a single invention but this may need to be reconsidered after amendment. Further searching may also be necessary.

Publication

I estimate that, provided you have met all formal requirements, preparations for publication of your application will be completed soon after **9 March 2004**. You will then receive a letter informing you of completion and telling you the publication number and date of publication.

Amendment/withdrawal

If you wish to file amended claims for inclusion with the published application, or to withdraw the application to prevent publication, you must do so before the preparations for publication are completed. **No reminder will be issued.** If you write to the Office less than 3 weeks before the above completion date, please mark your letter prominently: **"URGENT - PUBLICATION IMMINENT"**.

[†]Use of E-mail: Please note that e-mail should be used for correspondence only.



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Application No: GB 0224341.8

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4 April 2003

Yours faithfully

Anita Keogh
Examiner



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Application No: GB 0224341.8
Claims searched: 1-15

Examiner: Anita Keogh
Date of search: 3 April 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	-	GB 2374251 A ✓ (QINETIQ) see whole document
A	-	WO 1992/12579 A1 ✓ (TELENOKIA) see whole document
A, E	-	GB 2376567 A ✓ (MOBISPHERE) see abstract
A	-	GB 2362295 A ✓ (MOTOROLA) see abstract
A	-	GB 2349045 A ✓ (FUJITSU) see abstract

Categories:

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art.
Y Document indicating lack of inventive step if combined with one or more other documents of same category.	P Document published on or after the declared priority date but before the filing date of this invention.
& Member of the same patent family	E Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^v:

H1Q, H4L

Worldwide search of patent documents classified in the following areas of the IPC⁷:

H01Q, H04B, H04Q

The following online and other databases have been used in the preparation of this search report:

EPODOC, JAPIO, WPI